

March 18, 2015

Mr. Paul Baker  
State of Utah  
Department of Natural Resources  
Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
Salt Lake City, Utah 84114-5801

**Re: Response to Second Review of Revised Notice of Intention (NOI) to Commence Large Mining Operations – M/047/0090 – U.S. Oil Sands, Inc., PR Spring Mine**

Dear Mr. Baker:

U.S. Oil Sands, Inc. has completed our response to the Division's second comment letter dated February 25, 2015. Since there were only three remaining comments, the responses were incorporated into the final revised NOI and two complete clean copies are being submitted. The submittal also includes a document showing where the remaining comment modifications were made.

U.S. Oil Sands, Inc. now requests tentative approval of the Revised Notice of Intention to Commence Large Mining Operations – M/047/0090. Should there be additional questions or requests, please feel free to contact me. As always, we appreciate your help in this permitting process.

Sincerely,



Doug Thornton, HSE & Regulatory Manager

Enclosures

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cc: Karla Knoop, Stantec

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Suite #1600, 521 – 3<sup>rd</sup> Avenue SW, Calgary, AB, T2P 3T3 CANADA Office 403-233-9366 Fax 587-353-5373

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To: Paul Baker  
Utah Division of Oil, Gas and Mining  
File: M/0047/0090

From: Karla Knoop  
Date: March 20, 2015

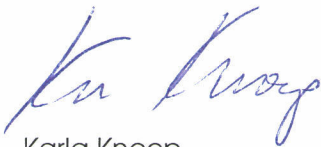
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**Reference: U.S. Oil Sands (USOS) PR Spring Mine Response to Second Review – List of Pages**

The following items are enclosed:

- 1) USOS Transmittal Letter
- 2) Two complete, clean copies of the NOI including all figures and appendices
- 3) NOI text pages 25, 26, and 27, showing redlined changes in response to Division comment 28
- 4) New Figure "e" added to the end of Appendix G, in response to Division comments 7 and 23
- 5) Updated MSDS added to the end of Appendix D, with appropriate reference added to NOI page 15

**STANTEC CONSULTING SERVICES INC.**



Karla Knoop  
Phone: (801) 943-4144  
Fax: (801) 942-1852

Attachments included

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Scientific name	Common name	Relative abundance
<i>Frasera speciosa</i>	Monument plant	Occasional at mid-hi elev
<i>Lithospermum incisum</i>	Puccoon or Fringed gromwell	Occasional at mid-hi elev
<i>Stanleya pinnata</i>	Wallflower	Occasional at mid-hi elev
<i>Cryptantha glomerata</i>	Popcorn flower	Occasional at mid-hi elev
<i>Phacelia linearis</i>	Narrow-leafed phacelia	Occasional at mid-hi elev
<i>Antennaria sp.</i>	Pussy toes	Occasional at mid-hi elev
<i>Saxifraga sp</i>	Brook saxifrage	Occasional at mid-elev
<i>Osmorhiza heteroi</i>	Mountain sweet cicely	Occasional at mid-elev
<i>Erodium cicutarium</i>	Red stem filaree	Common under aspen
<i>Achillea millefolium</i>	Yarrow	Occasional under aspen
<i>Maianthemum stellatum</i>	False Solomon's seal	Occasional under aspen
<i>Urtica dioica</i>	Stinging nettle	Occasional under aspen
<i>Descurainia pinnata</i>	Flixweed	Common under aspen
<i>Cirsium arvense</i>	Canada thistle	Occasional under aspen
<b>Grasses &amp; Grass-like</b>		
<i>Poa sandbergii</i>	Sandberg bluegrass	Common at mid-hi elev
<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Common at mid-hi elev
<i>Achnatherum hymenoides</i>	Indian ricegrass	Occasional at mid-hi elev
<i>Pascopyron smithii</i>	Western wheatgrass	Common at mid-hi elev
<i>Carex sp.</i>	Dry-land or mountain sedge	Common under firs
<i>Calamagrostis purpurascens</i>	Purple Reedgrass	Occasional under firs
<i>Bouteloua gracilis</i>	Grama grass	Occasional at mid-elev
<i>Poa pratensis</i>	Kentucky bluegrass	Common under aspen
<i>Leymus cinereus</i>	Ryegrass	Occasional under aspen
<i>Carex aquatilis</i>	Water sedge	Seasonally
<i>Scirpus sp.</i>	Rush	Seasonally

#### 106.8. Depth to Groundwater

The depth to the regional groundwater table in the vicinity of the PR Spring Mine is expected to be 1,500 feet or more (Price and Miller 1975). The operator's two production wells confirm this depth. The westernmost well is located at a ground surface elevation of 7,880 feet and is 2,550 feet deep. The easternmost well is located at a ground surface elevation of 8,043 feet and is 2,200 feet deep. The static water level in each is at approximately 6,400 feet in elevation, according to information on file with the State Engineer's Office.

No USGS mapped springs or seeps are located within the Phase 1 project area (see **Figure 9**). Further, a June 2014 site visit by the operator, DOGM, and DWQ, to specifically look for known and unknown seeps and springs, found no indication of springs, seeps, or other groundwater expressions within the Phase 1 area. In 2011 the operator conducted extensive geologic exploration drilling at the site. The operator drilled 59 exploration holes, at average depths of approximately 150 feet below ground surface, throughout the Phase 1 Project area and did not encounter groundwater (See **Figure 2**). These investigations confirm an absence

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of shallow ground water in the Phase 1 Project area. Groundwater is discussed further in Section 109.1 and in **Appendix B**, within correspondence supporting Permit-by-Rule coverage under the Utah DWQ's groundwater protection program.

#### Extent of Overburden Material

The oil sands beds outcrop in PR Canyon to the northeast of the mine area, and in Main Canyon to the southwest of the mine area (Murphy, Leonard A., 2003 private report). Based upon several coring programs in and near the Phase 1 project area, the operator estimates that average depth to mineable ore (and thus overburden thickness) is approximately 20 feet, with areas near the outcrop having virtually no overburden, and areas on the southwest side having up to 50 feet of overburden.

Interburden extent is also a consideration in the Phase 1 project because multiple oil sands beds will be mined (**Figures 6a-b**). Between Bed D and Bed C there is a layer of interburden that averages 30 feet in thickness; between Bed C and Bed B, interburden averages 25 feet in thickness. Bed D averages 11 feet thickness and the Bed C averages 23 feet in thickness. Bed B averages 24 feet in thickness. Volumes associated with overburden, interburden, and ore were provided in Table 3 above (see Section 106.4).

#### Geology

Bedrock on SITLA lands leased by the operator includes thick, buff-to-cream, rim-forming, cross bedded sandstone cropping out in the bottom of Main Canyon. These rocks were mapped by Gaultieri (1988) as the Renegade Member of the Wasatch Formation consisting of medium to thick, indistinctly banded sandstone with sparse shale. These beds are overlain by the Green River Formation containing lenticular beds of lacustrine sandstone saturated with bitumen separated by intervals of barren sandstone, siltstone, shale, mudstone and calcareous marl. Five distinct asphalt impregnated sands, labeled A, B, C, D and E, with E the highest strata, occur in the upper portion of the Douglas Creek Member of the Green River Formation (Byrd, William D. 1970) and (Clem, K. 1984). The E bed is regionally known, but is not present locally in or near the Phase 1 project area. The beds crop out in PR Canyon to the northeast and Main Canyon to the southwest of County Road 2810 (Seep Ridge Road). All four of the local beds occur in an interval 240 to 290 feet thick (Murphy, Leonard A., 2003 private report).

The 2011 core drilling program identified the lithology of the layered overburden, interburden, asphalt beds and area slightly below the beds in the Phase 1 project area. Figures 6a-c provides a cross section view. Mine resource development targets the D and C bed lenses and clips into the B bed in some localized areas. The A bed of the Douglas Creek Member is left intact.

Most of the resource development drilling in the Phase 1 project area does not penetrate to significant depths below the A bed asphaltic lenses. However, a few core holes within the Phase 1 project area were drilled to approximately 300 feet

below the ground surface. These holes show interbedded siltstones (approximately 70 feet cumulative thickness), sandstones (approximately 40 feet cumulative thickness) and limestones (approximately 15 feet cumulative thickness) below the A bed, which is indicative of the Green River Formation.

**Figure 8** provides a geology map. In the area of the opening pit, the strike of the beds is N 20° E, and the dip is 1.2-1.7° NW. The axis of the San Arroyo Anticline trends N 60° W veering to a S 45° W trend 1-2 miles east of the Affected Area. The strike and dip of the ore beds vary slightly throughout the planned mine area as the host formations are part of a gentle anticlinal structure, but dip probably averages about 1.5°.

The Basal Member of the Green River Formation underlies the Douglas Creek Member and overlies the Wasatch Formation. According to Byrd (1970), this interval represents a transition in depositional environment from fluvial to typical lacustrine. Below that, the Wasatch Formation rests with slight unconformity on the Tuscher Formation; or, where the Tuscher Formation is missing, the Wasatch rests with greater angular discordance on the Mesaverde Formation (Byrd 1970).

**Deleted:** The planned mining would extend into the B bed of the Douglas Creek Member, leaving the A bed intact.

### 106.9. Ore and Waste Stockpiles

The mined oil sands will be stockpiled at the plant site in areas shown on **Figure 3a**. Generally, the operator will maintain a two-week supply of ore at the plant site, which means that approximately 60,000 cubic yards of raw oil sands will be stockpiled at any one time, awaiting processing. This material would be piled with the radial stacker within loader tram distance of the inlet feed hopper. Additional ore and processed solids (awaiting backfill) may be stockpiled in the auxiliary storage area. In addition, up to 2,500 cubic yards of reject material (oversized rock barren of bitumen rejected from the plant as well as any subgrade ore rejected at the ore stockpile) will be piled at any one time in a location near the solids stockpiles, prior to being returned to the pit as backfill or disposed of in the OIS storage areas. Specific storm water management practices for the plant site will be detailed in the SWMP.

#### TAILINGS FACILITIES

There will be no liquid tailings ponds associated with this mining operation. The separated solids will be placed in OIS storage areas and in pit backfills, as described above in Section 106.2.

#### WATER STORAGE/TREATMENT PONDS

Water pumped from the previously described production wells and piped to the plant site will be stored in a raw water tank until needed. The capacity of this tank will be approximately 26,250 gallons (625 barrels). In addition, recycled process water will be stored in four insulated, 42,000 gallon (1,000-barrel), storage tanks.

There will be no treatment ponds located on the site. However, a storm water retention pond will be located at the low point of the plant site, and will collect all